

**REMARKS**

Applicants thank the Examiner for the attention accorded the present Application in the May 25, 2005 Non-Final Office Action, in which claims 1-35 were pending. By the foregoing amendments, claims 13, 14, 16, 31 and 32 have been cancelled, and claims 1, 17-22, 29 and 30 have been amended to more clearly specify the present invention. No new matter has been added, and the amendments are fully supported throughout the specification, as more fully described below.

Claims 1-12, 15, 17-30 and 33-35 are now currently pending in this Application. Based on the above amendments, Applicants respectfully submit that the rejections to these claims have been overcome. Reconsideration of this Application, and allowance of claims 1-12, 15, 17-30 and 33-35, is respectfully requested in view of the foregoing amendments and the following remarks.

**Drawing objections and 35 USC §112, first paragraph rejections**

The Examiner noted that the claimed features of claims 13, 14, 31 and 32 are not shown in the drawings; that these claims are rejected under 35 U.S.C. § 112, first paragraph as failing to comply with the enablement requirement; and that these claims are rejected under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Applicants have cancelled claims 13, 14, 31 and 32. Thus, Applicants respectfully request that the Examiner withdraw this objection to the drawings and these rejections to claims 13, 14, 31 and 32.

**35 USC § 112, second paragraph rejections**

Claim 21 stands rejected under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Examiner noted that in claim 21, “3600°” shall be “360°”. Applicants respectfully submit that “3600°” is correct as written in

original claim 21. If the helix made only a  $\frac{1}{4}$  turn (or 0.25 turns), the rotation of the helix overall would be only about  $90^\circ$  ( $360^\circ/\text{turn} \times .25 \text{ turns} = 90^\circ$  total). But, if the helix made ten (10) turns, then the rotation of the helix overall would be about  $3600^\circ$  ( $360^\circ/\text{turn} \times 10 \text{ turns} = 3600^\circ$  total). As such, Applicants' respectfully request that this rejection to claim 21 be withdrawn.

**Joint Inventors**

The subject matter of all claims in this application were commonly owned at the time any inventions covered herein were made.

**35 U.S.C. § 102(a) rejections**

Claims 1, 2, 15, 25, 29, 30 and 34 stand rejected under 35 U.S.C. §102(a) as being anticipated by Applicant's admitted prior art as set forth in page 2 of Applicants' specification. Applicants respectfully disagree with the Examiner's conclusion and submit that the present invention is not anticipated, nor even suggested, by any prior art described by Applicants.

As originally and presently claimed in Applicants' independent claims 1, 29, 30 Applicants' invention comprises systems and methods that utilize three elements: (a) a seed crystal, (b) a grain selector, and (c) a grain selector support.<sup>1</sup> The inventors discovered that when a grain selector is utilized in combination with a seed crystal, better results can be obtained than were previously possible utilizing either a seed crystal or a grain selector alone. "Generally, it has been believed that the use of grain selectors 30 is not necessary, and is often not even desired, when seed crystals 34 are used. However, it has been found that utilizing grain selectors 30 in addition to seed crystals 34 helps improve production yields and promote the formation of the optimum desired crystal structures in the final cast components, especially in the presence of bad or noisy crystal growth starts."<sup>2</sup> The single crystal casting techniques described by Applicants utilized only one of a seed crystal or a grain selector, but not both together. Paragraphs [0004]

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<sup>1</sup> Applicants' spec., independent claims 1, 29 and 30.

<sup>2</sup> Applicants' original spec., paragraph [0024].

and [0024] have been amended to clarify that point as was originally more clearly described in paragraph [0024] and in independent claims 1, 29 and 30. None of the prior art described by Applicants utilized all three of the elements as claimed in Applicants' independent claims.

Based on the above arguments and amendments, Applicants respectfully submit that independent claims 1, 29 and 30 of the present invention are patentably distinguished from any prior art Applicants' described. As claims 2, 15 and 25 depend from claim 1, and claim 34 depends from claim 30, the discussion above applies to these claims as well. Further, these claims each include separate novel features. Thus, Applicants respectfully request that the Examiner withdraw this rejection and allow pending claims 1, 2, 15, 25, 29, 30 and 34.

### **35 U.S.C. § 102(b) rejections**

Claims 1-3, 15, 17, 24-26, 29, 30, 34 and 35 stand rejected under 35 U.S.C. §102(b) as being anticipated by either Monte I (US 5,062,468), Monte II (US 5,062,469) or Jeyarajan. Applicants respectfully disagree with the Examiner's conclusion and submit that the present invention is not anticipated, nor even suggested, by any of Monte I, Monte II or Jeyarajan.

As presently claimed in Applicant's independent claims, Applicant's invention comprises at least these three elements: (a) a seed crystal, (b) a grain selector, and (c) a grain selector support, "wherein the grain selector comprises a non-linear tubular structure comprising at least one of: a helix, a three-dimensional bend, a staircase, and a zigzag."<sup>3</sup> The amendments to these claims are supported by Applicants' original claim 16, among other places.

In contrast, none of Monte I, Monte II or Jeyarajan disclose utilizing a seed crystal, a grain selector and a grain selector support, *wherein the grain selector comprises a non-linear tubular structure comprising at least one of: a helix, a three-dimensional bend, a staircase, and a zigzag*. Each of Monte I, Monte II and Jeyarajan

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<sup>3</sup> Applicants' spec., independent claims 1, 29 and 30.

repeatedly disclose using a grain selector having only a single bend.<sup>4</sup> While various embodiments of grain selectors are disclosed in each of Monte I, Monte II and Jeyarajan, all the disclosed embodiments only comprise a single bend. No other configurations are disclosed or suggested anywhere in any of Monte I, Monte II or Jeyarajan. Additionally, each of Monte I, Monte II and Jeyarajan actually teach away from the more complex grain selector configurations of the present invention by repeatedly noting how much less their configurations cost, and how much less complicated the tooling is for their configurations.<sup>5</sup> Therefore, none of Monte I, Monte II or Jeyarajan anticipate, nor even suggest, utilizing a seed crystal, a grain selector and a grain selector support, wherein the grain selector comprises a non-linear tubular structure comprising at least one of: a helix, a three-dimensional bend, a staircase, and a zigzag, as recited in independent claims 1, 29 and 30 of Applicants' invention.

Based on the above arguments and amendments, Applicants respectfully submit that independent claims 1, 29 and 30 of the present invention are patentably distinguished from each of Monte I, Monte II and Jeyarajan. As claims 2-3, 15, 17 and 24-26 depend from claim 1, and claims 34-35 depend from claim 30, the discussion above applies to these claims as well. Further, these claims each include separate novel features. Thus, Applicants respectfully request that the Examiner withdraw this rejection and allow pending claims 1-3, 15, 17, 24-26, 29, 30, 34 and 35.

### **35 U.S.C. § 103(a) rejections**

#### **1. Claims 3-14, 16-24, 26-28, 31-33 and 35**

Claims 3-12, 17-24, 26-28, 33 and 35 stand rejected under 35 U.S.C. §103(a) as being unpatentable over applicant's admitted prior art as set forth in page 2 of the specification. As previously noted above, the single crystal casting techniques described by Applicants utilized only one of a seed crystal or a grain selector, but not both together

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<sup>4</sup> See, e.g., Monte I, col. 6, lines 34-42 and Figs. 2, 4 and 5; Monte II, col. 5, lines 60-68 and Figs. 2, 4, 5 and 9; and Jeyarajan, col. 4, lines 60-68 and Figs. 2 and 4.

<sup>5</sup> See, e.g., Jeyarajan, col. 4, lines 42-45; Monte I, col. 1, lines 20-35; and Monte II, col. 1, lines 17-34.

as currently claimed by Applicants. As such, Applicants did not admit to any prior art that would make their invention obvious.

Based on the above arguments and amendments, Applicants respectfully submit that independent claims 1, 29 and 30 of the present invention are patentably distinguished from any prior art that Applicants described. As claims 3-12, 17-24 and 26-28 depend from claim 1; and claims 33 and 35 depend from claim 30; the discussion above applies to these claims as well. Further, these claims each include separate novel features. Thus, Applicants respectfully request that the Examiner withdraw this rejection and allow pending claims 3-12, 17-24, 26-28, 33 and 35.

## 2. Claims 4-14, 18-23, 27, 28 and 31-33

Claims 4-12, 18-23, 27, 28 and 33 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Monte I (US 5,062,468), Monte II (US 5,062,469) or Jeyarajan. Applicants respectfully disagree with the Examiner's conclusion and submit that the present invention is not obvious in view of, nor is it even suggested by, Monte I, Monte II and/or Jeyarajan.

As previously noted above, Applicant's invention comprises at least these three elements: (a) a seed crystal, (b) a grain selector, and (c) a grain selector support, "wherein the grain selector comprises a non-linear tubular structure comprising at least one of: a helix, a three-dimensional bend, a staircase, and a zigzag."<sup>6</sup>

In contrast, and as also previously discussed above, none of Monte I, Monte II or Jeyarajan disclose utilizing a seed crystal, a grain selector and a grain selector support, *wherein the grain selector comprises a non-linear tubular structure comprising at least one of: a helix, a three-dimensional bend, a staircase, and a zigzag*. As none of Monte I, Monte II or Jeyarajan disclose any grain selector configurations other than those having a single bend, combining any of these references will not yield Applicants' invention. As such, these references, even if combined, are deficient as references against Applicants' invention.

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<sup>6</sup> Applicants' spec., independent claims 1, 29 and 30.

Based on the above arguments and amendments, Applicants respectfully submit that independent claims 1, 29 and 30 of the present invention are patentably distinguished from Monte I, Monte II and/or Jeyarajan. As claims 4-12, 18-23, 27 and 28 depend from claim 1; and claim 33 depends from claim 30; the discussion above applies to these claims as well. Further, these claims each include separate novel features. Thus, Applicants respectfully request that the Examiner withdraw this rejection and allow pending claims 4-12, 18-23, 27, 28 and 33.

### 3. Claims 1-35

Claims 1-35 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Burd and further in view of either applicant's admitted prior art as set forth in page 2 of the specification, Monte I (US 5,062,468), Monte II (US 5,062,469) or Jeyarajan. Applicants respectfully disagree with the Examiner's conclusion and submit that the present invention is not obvious in view of, nor is it even suggested by, applicant's admitted prior art, Monte I (US 5,062,468), Monte II (US 5,062,469), Jeyarajan, and/or Burd.

As previously noted above, Applicant's invention comprises at least these three elements: (a) a seed crystal, (b) a grain selector, and (c) a grain selector support, "wherein the grain selector comprises a non-linear tubular structure comprising at least one of: a helix, a three-dimensional bend, a staircase, and a zigzag."<sup>7</sup>

In contrast, and as also previously discussed above, applicant's admitted prior art, Monte I, Monte II and Jeyarajan are deficient as references against the present invention. Burd fails to cure the deficiencies of applicant's admitted prior art, Monte I, Monte II and Jeyarajan. Burd does not disclose utilizing a seed crystal, a grain selector and a grain selector support, *wherein the grain selector comprises a non-linear tubular structure comprising at least one of: a helix, a three-dimensional bend, a staircase, and a zigzag* either. Burd never even mentions the possibility of using a seed crystal. Additionally, one skilled in the art would not combine any of the cited references to produce Applicants' invention because there is no suggestion in any of the references that features

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<sup>7</sup> Applicants' spec., independent claims 1, 29 and 30.

of any of the other references may be desirable. “The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.”” *In re Mills*, 916 F.2d 680, 680-82, 16 USPQ2d 1430, 1430-32 (Fed. Circ. 1990) (as quoted in MPEP §2143.01). “The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification.”” *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Circ. 1984). There is no suggestion in any of applicant’s admitted prior art, Monte I, Monte II, Jeyarajan and/or Burd to make the combination suggested by the Examiner, or to modify any of the references as suggested by the Examiner. Furthermore, as previously noted above, Monte I, Monte II and Jeyarajan actually teach away from the more complex grain selector configurations of the present invention. As such, one skilled in the art would not be motivated to combine any of applicant’s admitted prior art, Monte I, Monte II, Jeyarajan and/or Burd. Therefore, Applicants respectfully submit that the Examiner has not established a *prima facie* case of obviousness. As such, Applicants request that the rejections based on applicant’s admitted prior art, Monte I, Monte II, Jeyarajan and/or Burd be withdrawn.

Based on the above arguments and amendments, Applicants respectfully submit that independent claims 1, 29 and 30 of the present invention are patentably distinguished from applicant’s admitted prior art, Monte I (US 5,062,468), Monte II (US 5,062,469), Jeyarajan, and/or Burd. As claims 2-12, 15 and 17-28 depend from claim 1; and claims 33-35 depend from claim 30, the discussion above applies to these claims as well. Further, these claims each include separate novel features. Thus, Applicants respectfully request that the Examiner withdraw this rejection and allow pending claims 1-12, 15, 17-30 and 33-35.

### **CONCLUSION**

Applicants respectfully submit that the amendments to the claims, together with the arguments presented above, successfully traverse the rejections given by the Examiner in the Office Action. For the above reasons, it is respectfully submitted that the pending claims patentably distinguish the present invention from the cited references.

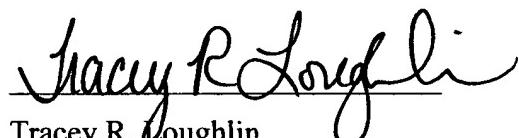
Allowance of pending claims 1-12, 15, 17-30 and 33-35 is therefore respectfully requested.

As this response is being timely filed within six (6) months of the mailing date of the Non-Final Office Action (05/25/05), Applicants believe that the only fees due are **\$1020** for a three (3) month extension of time. If this is incorrect, however, the Commissioner is authorized to charge any additional fees that may be due, or credit any overpayment, to **Deposit Account Number 21-0279, Order No. EH-11132**.

Should the Examiner have any questions, or determine that any further action is necessary to place this Application into better form for allowance, the Examiner is encouraged to telephone the undersigned representative at the number listed below.

Respectfully submitted,

Date: 11/23/05



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